Integrating exposure into chemical alternatives assessment using a qualitative approach

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Published in:
Abstract book - SETAC North America 37th Annual Meeting/7th World Congress

Publication date:
2016

Document Version
Publisher's PDF, also known as Version of record

111 Integrating Exposure into Chemical Alternatives Assessment Using a Qualitative Approach B. Greggs, Soleil Consulting, LLC; S. Arnold, The Dow Chemical Company; T.J. Burns, Novozymes; P. Egeghy, U.S. Environmental Protection Agency / Office of Research and Development; P. Fantke, Technical University of Denmark / Quantitative Sustainability Assessment Division; B. Gaborek, DuPont; L.G. Heine, Lauren Heine Group LLC; O. Jolliet, University of Michigan; C. Lee, ExxonMobil / Dept of Tox Enviro Chemistry; D.C. Muir, Environment Canada / Aquatic Contaminants Research Division; K. Plotzke, Dow Corning / Health Environmental Sciences; J.P. Rinkevich, SciVera LLC; N. Sunger, West Chester University; J. Tanir, HESI; M. Whittaker, ToxServices LLC. Most alternatives assessments (AA) published to date are largely hazard-based rankings, and as such may not represent a fully informed consideration of the advantages and disadvantages of possible alternatives. With an assessment goal of identifying an alternative chemical that is more sustainable, other attributes beyond hazard are also important, including exposure, risk, life-cycle impacts, performance, cost, and social responsibility. Building on the 2014 recommendations by the U.S. National Academy of Sciences to improve AA decisions by including comparative exposure assessment, the HESI Sustainable Chemical Alternatives Technical Committee, which consists of scientists from academia, industry, government, and NGOs, has developed a qualitative comparative exposure approach. Conducting such a comparison can screen for alternatives that are expected to have a higher human or environmental exposure potential, which could trigger a higher-tiered, more quantitative exposure assessment on the alternatives being considered, minimizing the likelihood of regrettable substitution. This talk will demonstrate an approach for including chemical- and product-related exposure information in a qualitative AA comparison. Starting from existing hazard AAs, a series of three chemical-product application scenarios were examined to test the concept, to understand the effort required, and to determine the value of exposure data in AA decision-making. The group has developed a classification approach for ingredient and product parameters to support comparisons between alternatives as well as methodology to address exposure parameter relevance and data quality. The ingredient parameters include a range of physicochemical properties that can impact routes and magnitude of exposure, while the product parameters include aspects such as exposure pathways, use pattern, frequency/duration of use, chemical concentration in product, and use volume, accessibility, and disposal. Key learnings, challenges, and opportunities for further work will also be presented. The views expressed in this presentation do not necessarily reflect the views or policies of the U.S. Environmental Protection Agency.